lever-induced jumpout. As a shift is not occurring, this will have no adverse effect on shift quality. When an intent to do a lever shift or a shift in progress is sensed, there is no requirement to prevent jumpout and detent resistance or force is minimized to improve shift quality by reducing shift effort. In more automated systems, this will allow smaller shift actuators to be utilized.

FIG. 5 illustrates one embodiment of a variable shift rail detent mechanism. Shift rail 150 (also called a "shift shaft") has in-gear notches 152 and 154 which will align with a detent mechanism 156 when the transmission is engaged in 1/2, 5/6 or 9/10(A) or in R, 3/4 or 7/8, respectively. A land 158 exists between notches 152 and 154. Alternatively, a small neutral detent (shown in dashed lines) may be utilized.

Shift rail 150 will typically carry one or more shift forks 151 for axially positioning clutch members 151A in engaged or disengaged positions, as is well known in the prior art.

The detent mechanism includes a plunger 160 having tapered tip 162 receivable in the notches and a piston end 164 receivable in a cylinder 166. A light compressor spring 168 biases the plunger downwardly into contact with the notches. The piston and cylinder define a selectively pressurized and exhausted chamber 170 which is controlled by an actuator valve 172 under command from ECU 146.

Upon sensing an intent to shift, chamber 170 is exhausted to minimize the resistance to axial movement of shift rail 150. Upon sensing a desire to remain engaged, the chamber 170 is pressurized to maximize the detent force and, thus, the resistance to axial movement of the shift rail to resist shift l(ever-induced jumpout. An onboard source S of pressurized fluid, such as hydraulic fluid or pressurized air, may be used to pressurize chamber 170.

The detent mechanism of FIGS. 6 and 6A is similar to that illustrated in FIG. 5 in that a shift rail is provided with in-gear notches 178 and 180 corresponding generally to notches 152 and 154, respectively. Notches 17E8 and 180, however, are not tapered. The notches 178 and 180 cooperate with a non-tapered tip 182 of a plunger member 184 of a detent mechanism 186. Plunger member 184 includes a two-sided piston portion 188 slidably and sealingly received in a cylinder 190. The piston portion 188 and cylinder 190 define two separate chambers 192 and 194, which are alternately pressurized and exhausted by control valve 196 under command from ECU 146 to cause the plunger to assume an extended or retracted position. The retracted position of the plunger is illustrated in FIG. 6A.

The mechanism in FIG. 6 provides a positive resistance to axial movement of the shift rail 176, as opposed to the resilient resistance to axial movement of shift rail 150 provided by the mechanism illustrated in FIG. 5. Both types of mechanisms, and modifications thereof, are suitable for the present invention. FIG. 8 illustrates, in a flow chart format, the method of the present invention.

The embodiment illustrated in FIG. 7 is substantially identical to that of FIG. 5, except that neutral detent 158A is intended to positively retain the shift shaft 150 in the neutral condition and a control unrelated to dynamic shifting, such as a heater control, provides a control input. As is known, in a heavy-duty truck, often it is desirable to leave the engine running in neutral for a long period of time to power the heater, the refrigeration unit or the like. Under such conditions, it is very desirable to positively lock the transmission in neutral. Plunger 160 will cooperate with detent 158A to provide such a positive locking.

Although the present invention has been described with a certain degree of particularity, it is understood that the description of the preferred embodiment is by way of

example only and that numerous changes to form and detail are possible without departing from the spirit and scope of the invention as hereinafter claimed.

We claim:

1. A transmission system (10) comprising a master friction clutch (14) for drivingly coupling an engine (12) to a compound mechanical transmission (16) including a main section and an auxiliary section, a shift member (150, 176) for moving a selected positive clutch member (151A) in said main section to a selected one of an engaged or a disengaged position and means (120, 146) independent of operation of said shift member and said master friction clutch for sensing a requirement to move said selected positive clutch member from said engaged position to said disengaged position and for providing an intent-to-shift signal indicative thereof, said system characterized by:

a detent mechanism (156/172, 186/196) for providing a selectively variable resistance to movement of said clutch member from said engaged to said disengaged position, said detent mechanism having a first condition for providing a greater resistance to movement of said clutch member from said engaged to said disengaged position and a second condition for applying a lesser resistance to movement of said clutch member from said engaged to said disengaged position, said detent mechanism assuming said second condition upon sensing said intent-to-shift signal.

2. A method for controlling a transmission system comprising a master friction clutch (14) for drivingly coupling an engine (12) to a compound mechanical transmission (16) including a main section and an auxiliary section, a shift member for moving a selected positive clutch member in said main section to a selected one of an engaged or a disengaged position, means independent of operation of said shift member and said master friction clutch for sensing a requirement to move said selected positive clutch member from said engaged position to said disengaged position and for providing an intent-to-shift signal indicative thereof, and a detent mechanism for providing a selectively variable resistance to movement of said clutch member from said engaged to said disengaged position, said detent mechanism having a first condition for providing a greater resistance to movement of said clutch member from said engaged to said disengaged position and a second condition for applying a lesser resistance to movement of said clutch member from said engaged to said disengaged position, said method comprising:

in the absense of said intent-to-shift signal, causing said detent mechanism to assume said first condition, and

upon sensing said intent-to-shift signal, causing said detent mechanism to assume said second condition.

3. The method of claim 2 wherein said means provides a signal indicative of a target gear ratio and said method further comprises causing said detent mechanism to assume said first condition upon sensing engagement of said target gear ratio.

4. A manually shifted change-gear transmission system comprising a master friction clutch (14) for drivingly coupling an engine (12) to a compound mechanical transmission (16) including a main section and an auxiliary section, a manually operated shift lever for moving a selected clutch member in said main section to a selected one of an engaged or a disengaged position, said transmission system comprising:

means independent of operation of said master friction clutch and manual movement of said shift lever to sense an operator desire to shift said clutch member

from said engaged to said disengaged position and to provide a signal indicative thereof, and

a detent mechanism for providing a selectively variable resistance to movement of said clutch member from said engaged to said disengaged position, said detent mechanism having a first condition for providing a greater resistance to movement of said clutch member from said engaged to said disengaged position and a second condition for applying a lesser resistance to movement of said clutch member from said engaged to said disengaged position, said detent mechanism assuming said second condition upon sensing said signal.

5. A partially automated transmission system comprising a fuel-controlled engine, an engine controller for controlling fueling of the engine in accordance with command output signals, a compound multiple-speed mechanical transmission having an input shaft driven through a master friction clutch by the engine, an output shaft, a main transmission section shifted by a manual shift lever and an auxiliary section, an operator selector movable to a first position for selection of upshifts to a target ratio and to a second position for selection of downshifts to a target ratio, and a control unit for receiving input signals and processing same according to predetermined logic rules to issue command output signals, said system characterized by:

a detent mechanism for providing a selectively variable resistance to movement of said shift lever from a ratio-engaged to a ratio-disengaged position, said detent mechanism having a first condition for providing a greater resistance to movement of said shift lever from said ratio-engaged to said ratio-disengaged position and a second condition for applying a lesser resistance to movement of said shift lever from said ratio-engaged to said ratio-disengaged position, and

said logic rules being effective to determine, independently of operation of said master friction clutch and said shift lever, a driver intent to move said shift lever to said ratio-disengaged position and, upon sensing such intent, causing said detent mechanism to assume said second condition.

6. The transmission system of claim 5 wherein said shift lever is operable to cause axial movement of a shift rail, said detent mechanism comprising a notch in said rail and a detent plunger biased with variable force to engage said notch.

7. The transmission system of claim 6 wherein said notch and said plunger are provided with complementary ramped surfaces.

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